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A REVISION OF THE HOUSTONIA PURPUREA GROUP (RUBIACEAE)[1]

EDWARD E. TERRELL

The *Houstonia purpurea* group or species-complex includes seven named species: *H. purpurea* L., *H. canadensis* Willd. ex R. & S., *H. tenuifolia* Nutt., *H. longifolia* Gaertn., *H. lanceolata* (Poir.) Britt., *H. montana* (Chickering) Small, and *H. setiscaphia* Carr. These form a unit of closely related species distinct from all others in the genus. Fosberg (1954) placed *H. floridana* Standl. in this group (as a variety of *H. purpurea*), but its stout, woody tap root and "stalked" anthers indicate a much closer relationship to the *H. nigricans* group.

H. tenuifolia is occasionally confused with *H. nigricans* (Lam.) Fern. Although both have narrow cauline leaves, they may be distinguished easily by other characters. The former species has many small roots from a short, erect or horizontal, rootstock (a rhizome) and sessile anthers due to adnate filaments; the latter has a stout, woody tap root and anthers stalked by the freedom of the filaments from the corolla-tube.

Fosberg stated in 1937 that the genera *Houstonia* L., *Hedyotis* L., and *Oldenlandia* L. should be merged under *Hedyotis*. He reaffirmed this view in later papers (1941a, 1941b, 1943, 1954). Shinners (1949) accepted these conclusions and transferred Texas

[1]Parts of this study were aided by a Grant-in-Aid from the National Science Foundation administered through the Highlands Biological Station during the summer of 1957, also by the tenure in 1952-53 of a Mary S. Muellhaupt Postdoctoral Scholarship in Botany at the Ohio State University. Appreciation is expressed to Dr. R. T. Clausen (Cornell University) for guidance in early parts of this study, to the curators of herbaria from which loans were granted, and to my wife, Bessie Z. Terrell. Dr. G. M. Schulze (Botanical Museum, Berlin) supplied photographs of the type of *Houstonia canadensis*. Dr. H. L. Blomquist and Dr. R. L. Wilbur (Duke University) made certain suggestions regarding the manuscript.

species of *Houstonia* to *Hedyotis*. In contrast, Fernald (1950) and Gleason (1952) maintained *Houstonia* as a separate genus. In the present paper it is retained as a separate genus, a course I prefer to follow until further evidence is obtained on the many, diverse species comprising the large genus *Hedyotis* (sens. lat.). I have not studied these generic relationships in detail, but my concern has been with relationships within the group that forms the subject of the present paper.

Morphology and Cytology

Morphological evidence about the *Houstonia purpurea* group has come from herbarium and field studies and the growing of plants in pots and in gardens. Field work was most intensive in the central and southern Appalachians and in southern Ohio. All taxa have been collected and observed in the field over parts or most of their respective ranges. Certain collections have been transplanted and grown for short periods. One outdoor transplant of *H. purpurea* has been observed at intervals over a period of several years. Although it has not been possible to transplant all taxa to the same uniform garden, enough transplants have been made to indicate that morphological differences are primarily genetic rather than primarily environmental. That this is true is borne out by field observations: where two species grew together in nature they maintained their differences.

Many morphological characteristics were investigated to determine how the species differ. About a dozen characteristics turned out to be diagnostic, and these are more or less important, depending on the taxa involved. The species differ slightly in certain floral characters, but these are often inconstant and differ within a species from one population to another. In cases in which more constant floral differences exist these are no better than or are inferior in taxonomic usefulness to vegetative characters.

Over 4000 specimens were examined from the following herbaria (abbreviations from Lanjouw and Stafleu, 1956): University of Cincinnati (CINC); Wiegand Herbarium of Cornell University (CU); Duke University (DUKE); Chicago Natural History Museum (F); Florida Agricultural Experimental Station (FLAS); Florida State University (FSU);

University of Georgia (GA); Gray Herbarium of Harvard University (GH); State University of Iowa (IA); Indiana University (IND); University of Michigan (MICH); Missouri Botanical Garden (MO); North Carolina State College (NCSC); University of North Carolina (NCU); Tulane University (NO); New York Botanical Garden (NY); Oberlin College (OC); Ohio State University (OS); Philadelphia Academy of Natural Sciences (PH); University of Tennessee (TENN); U. S. National Herbarium (US); University of Wisconsin (WIS); West Virginia University (WVA). Other herbaria examined include that of the Great Smoky Mountains National Park and those of Dr. E. Lucy Braun, Mr. C. C. Deam, and Mr. E. J. Palmer.

Cytological data on this genus are largely lacking. For *H caerulea* (not in the *H. purpurea* group) Stevens (1912) reported a gametic number of 16. Fagerlind (1937) corrected this number to 18, and believed this species to be tetraploid since the basic number in the genus is 9.

Chromosome counts made by the writer in 1948 from immature anthers yielded the following data:

Species	Collection Number	Locality	Chrom. No.
H. purpurea var. *purpurea*	1974	Black Mountain, Harlan Co., Ky.	g=ca. 9 s=ca. 18
	S. J. Smith 5157	Tuscaloosa Co., Alabama	s=ca. 18
H. purpurea var. *calycosa*	2057	Clinton Co., Ohio	g=ca. 8–12
Var. *calycosa* (typical)	1926	cedar glades, Wilson Co., Tenn.	s=ca. 18
H. canadensis	2058	Chautauqua Co., N. Y.	s=ca. 18
Intergradant, *H. tenuifolia* — *H. longifolia* var. *compacta*	1990	Morgan Co., Ky.	g=ca. 9

These data suggested that at least three of the taxa in this complex are diploid.

Sizes of guard cells are sometimes correlated with polyploidy. It was thought that determination of these cell sizes in *Houstonia* might provide an indication of polyploidy. In 1958 measurements of stomatal guard cells were made on dried specimens by the method described by Celarier and Mehra (1958). One to four

different collections of the taxa accepted here were tested. Cell sizes were about the same in all taxa except the following: *H tenuifolia* varied from about the same as other taxa to about 30% larger; *H. purpurea* var. *montana* was slightly smaller. The general constancy of cell size was impressive. These results merely suggest further that polyploidy may not be involved in this complex; obviously, no more definite conclusions can be reached.

Taxonomy of the Group

The most recent revision of this genus was that of Standley (1918), in which the six then known species of the *H. purpurea* group were considered to be separate species. Robinson and Fernald (1908) and Fernald (1950) maintained those in the Gray's Manual range as distinct, although Fernald previously (1940) had questioned whether they should not all be considered as variations of one species, after seeing intergradation in the field in southeastern Virginia. Gleason (1952) upheld their separation, except in the case of *H. lanceolata*. Asa Gray in his Manuals had merged them as varieties of one species. Fosberg (1941a) advocated three species, but later (1954) combined them as Gray had done. The present writer (unpublished M. S. Thesis, Cornell University, 1949) tentatively recognized three species.

That two extreme viewpoints — each a separate species, or all one species — have been held in regard to this complex, is indicative of the nature of the problem it presents. If only typical specimens are examined the extremes are so different that many taxonomists would recognize three or four, or possibly even seven, species. On the other hand, if several hundred specimens of all kinds from throughout the respective ranges are examined, boundaries between taxa become indistinct and their circumscription difficult. In reference to this group in Indiana, C. C. Deam wrote (in correspondence) that generally the collector with a few specimens is able to identify them, but with a larger number, "then it is that you learn that the set are a bunch of renegades and do not conform to any rule or law."

Apparently with the tacit assumption that all of nature is basically orderly, the writer several years ago began studying this problem. After initial attempts at statistical and graphical meth-

ods to tame the renegades, the procedures employed evolved into what has been termed the morphological-geographical method. When the group is studied state by state, region by region, local area by local area, and the spatial continuity in morphology is followed, it can be seen that some order obtains and part if not all is not chaotic. Field study has been an important adjunct to this method, for differences and resemblances show up more clearly in the field than in the herbarium.

The present revision is of the basic taxa and does not include details on putative hybrids except where knowledge of these bears directly on taxonomy. A subsequent paper is planned to deal with such plants in more detail and to consider what evidence they provide concerning the origin and recent evolution of this group. Any taxonomic treatment of a species-complex must consider intergrading specimens and putative hybrids. They are what make this a complex; if all species were distinct and non-intergrading, this study would have been completed earlier, the taxonomy being obvious. The intergradant populations are now well enough understood so that future findings about them are not likely to change the taxonomic treatment as presented here.

Present evidence indicates that much of the variation is the result of hybridization. However, two species seem to cross in some localities but not in others, according to observations in the field. Where they do not cross there may be intermediate types of habitats available for intermediate kinds of plants; therefore, there seem to be genetic barriers, or at least non-ecological barriers, present which prevent crossing. All members of this group are heterostylous, a condition which in some other plant groups has been said to favor outcrossing.

In this treatment four species are recognized. Two of these have three varieties each and the other two are merely extremely variable. All species vary irregularly or clinally over their ranges and must be studied throughout their ranges before valid conclusions are forthcoming. Each species intergrades with the others, but not all varieties intergrade.

The term, intergrade, is used here as either a noun or a verb;

when used as a noun it is preferred over the noun intermediate, to indicate not intermediacy but complete intergradation (usually in several characters) between two taxa.

In order to determine how many intergrading specimens there actually are, a check was made of the writer's records of collections in two large eastern herbaria, the U. S. National Herbarium and the Gray Herbarium. From a total of 676 sheets, 78 sheets or 11.5% represent intergrades (to various degrees) between *H. purpurea* and *H. longifolia* var. *compacta*. Such collections are far more numerous than all other kinds of intergrades combined, which are only 3 or 4% of the total; in view of their obvious importance they are discussed in detail below. These percentages are only approximate, as these two herbaria do not contain by themselves a really complete or accurate statistical representation. Comparable figures from herbaria in North Carolina would show more than 11.5% of the kind of intergrade mentioned, and herbaria from certain northern states would show a lower figure. Using the available figures, one arrives at a total figure of 14-15% for intergrades of all kinds. This, however, is misleading, since some collections assigned to definite taxa are atypical, or have minor signs of presumed introgression, or are problematical in some other way.

The more significant kinds of intergrades are as follows (certain other kinds not listed here are cited in the systematic treatment):

1. *H. purpurea* var. *calycosa* — *H. canadensis*. Scattered and local in southern Ohio, central and western Kentucky, and southernmost Indiana.

2. *H. purpurea* — *H. tenuifolia*. Putative hybrids are rather frequent in Missouri and Arkansas, but rarer in the Appalachians. Distribution on Map 4.

3. *H. canadensis* — *H. longifolia* var. *longifolia*. Intermediates occur in northern Illinois (see Map 3 and citations under *H. canadensis*).

4. *H. tenuifolia* — *H. longifolia* var. *compacta*. Occur in eastern West Virginia, eastern Kentucky, and western Virginia (cited under former species).

5. *H. purpurea* — *H. longifolia* var. *compacta*.

These populations, constituting at least 11.5% of the total

complex, range from Ohio south into Georgia and Alabama (see Map 4). They are especially numerous in the southeast, where they recur again and again over a continuous land area in South Carolina and Georgia. This regional race may deserve some sort of formal taxonomic recognition, but it seems best to defer such action until more exact data are available on this morphologically heterogeneous group. Plants of these populations vary through the entire gamut of variation from intermediates into both supposed parental taxa. Leaf shapes vary from ovate, like *purpurea*, to narrow-elliptic, like *compacta*. Lower internodes of stems may have long, scattered hairs of the *purpurea* type, or fine, dense, grayish puberulence of the *compacta* type, or both types of vestiture may be intermixed on one plant. Mass collections from South Carolina and Georgia often include plants with a variety of leaf shapes and stem vestitures. Plants from the sandhills of the Carolinas and Georgia tend to be more like var. *compacta* and grade into it imperceptibly, while plants from the piedmont tend to be more like *H. purpurea* and likewise grade into it. All of these kinds of populations usually occur in disturbed or secondary habitats. In populations from locations north of the Carolinas it is sometimes very difficult to judge whether intermediate types of plants may not actually be apparent hybrids between *H. purpurea* and *H. tenuifolia*, but it is unlikely that these would constitute more than 20% of all collections placed in the present grouping. (Intergrades in this present grouping have been annotated generally by the writer in the past as between *H. purpurea* and *H. tenuifolia*, because it was earlier believed that *H. longifolia* var. *compacta* should be considered a subspecies of *H. tenuifolia*.).

The various types of intergrades listed above and those cited elsewhere are not the only kinds of problematical populations in this complex. To assign a certain collection to one taxon is sometimes arbitrary; in some of these cases the plants appear to be introgressants — more variable due to the influence of genes from another taxon. Certain other populations suggest hybrid derivation among three basic taxa. The solution of all such problems posed by this complex would seem to depend ultimately on

the use of detailed graphical and statistical methods along with transplant experiments and cytological studies.

It may be asked whether the *H. purpurea* group should not, as has been done by Gray and by Fosberg, be treated as one extremely variable species with several subspecies or varieties. To the present writer the following reasons are to be included among those favoring treatment of the extremes as separate species:

1. The four species in their extremes differ from each other by several well-marked morphological characters.
2. Many populations of the basic taxa occupy large extents of land over which they retain their essential distinctness in spite of a certain amount of intergradation.
3. Two species seem to cross in some geographic areas but not in others; therefore, isolating mechanisms exist between them under certain circumstances.
4. Certain taxa occur sympatrically. In this case they usually occupy somewhat different habitats but may occasionally grow together.

The situation in the *H. purpurea* group is comparable to that in the *Gilia tenuiflora-latiflora* group, as described by Grant (1957). The latter aggregate is a syngameon, a term which according to Grant (p. 67) "is the sum total of species or semispecies linked by frequent or occasional hybridization in nature; a hybridizing group of species; the most inclusive interbreeding population." In the case of the *Houstonia purpurea* complex we do not know definitely that hybridization is the cause of the variation. However, the general similarity of its patterns of variation to those in the *Gilia* group is striking. Grant stated (p. 63) that "treatment of *Gilia tenuiflora, G. latiflora,* and *G. cana* as a single species would obscure rather than accurately portray their relationships". The present writer feels that the same is true of the *Houstonia purpurea* group.

Systematic Treatment

The following description includes the more fundamental characteristics of the *Houstonia purpurea* group as well as the less fundamental ones which all four species have in common.

The taxonomic status of this group in the genus as a whole is in doubt until other species have been studied.

Flowers heterostylous. Corollas funnelform. Anthers sessile or with filaments free from corolla-tube as much as 1 mm.; anthers linear to oblong, 0.7–1.6 mm. long in thrum[2] flowers, 0.3–1.2 mm. long in pin flowers. Styles 1.3–2.2 mm. long in thrum flowers, 3–8 mm. long in pin flowers. Stigmas linear to oblong, 0.2–1.0 mm. long in thrum flowers, 0.5–1.30 mm. long in pin flowers. Capsules subglobose, slightly compressed, (¼–) ½ (–¾) inferior truncate or rounded or emarginate at apex. Seeds few — 35 per capsule, subcrateriform, oblong or roundish or angular, black, reticulate-pitted; hilum centered in concavity and ¼–¾ as long as entire seed.

KEY TO THE HOUSTONIA PURPUREA GROUP[3]

A. Median cauline leaves ovate or lanceolate, widest toward the base or at the middle: if ovate then 6–34 mm. wide and 1–3.2 times longer than wide; if lanceolate (4–10 mm. wide and L/W ratio 3.3–6) *then with calyx-lobes 4–7 mm. long.*

B. Calyx-lobes 1–3.9 mm. long; median cauline leaves broad-ovate to ovate-lanceolate, 1–3.2 times longer than wide.

C. Lowest internodes sparsely to densely pubescent (with hairs usually at least 0.4 mm. long) or hirsutulous or glabrate; median internodes 2–9 cm. long; median cauline leaves 10–60 mm. long, 6–34 mm. wide; corollas light purple or white.

1a. *H. purpurea* var. *purpurea.*

CC. Lowest internodes glabrous or stems only slightly pubescent on lower nodes; median internodes 0.5–4 cm. long; median cauline leaves 8–30 mm. long, 6–13 mm. wide; corollas deep purple; plants from summits of Roan Mt., N.C.-Tenn., and Grandfather Mt., N.C.

1b. *H. purpurea* var. *montana.*

BB. Calyx-lobes 4–7 mm. long; median cauline leaves varying from narrow-lanceolate to broad-ovate, 1–6 times longer than wide.

1c. *H. purpurea* var. *calycosa.*

AA. Median cauline leaves elliptic or obovate or linear, widest at the middle or near the apex or about equally wide for most of their lengths, or if narrow-lanceolate then calyx-lobes less than 4 mm. long; these leaves 1–6 (–8.5) mm. wide.

D. Basal leaves definitely ciliolate and pubescent above (glabrate in plants occurring locally in southcentral Ohio), present during flowering and fruiting; stems with 3–6 internodes; lower and/or middle internodes usually much longer than upper ones; median cauline leaves oblonceolate, obovate, or elliptic, 2.5–6 times longer than wide; calyx-lobes 1.6–3.5 (–4.5) mm. long . . . . . 2. *H. canadensis.*

[2]In heterostylous flowers, thrum refers to exserted anthers and included style and stigma; pin flowers have exserted style and stigma and included anthers.

[3]Excluding intergrading specimens.

DD. Not as above in all particulars.

E. Lowest internodes densely and finely cinereous-puberulent, with all hairs uniformly less than 0.4 mm. long, or densely papillose-puberulent, or if glabrous then median cauline leaves 9 or more times longer than wide.

F. Stems with 3–9 (–11) internodes; median internodes 3–8 cm. long; median cauline leaves linear to narrow-elliptic, 7–20 or more times longer than wide; fertile branches usually with only 1–3 nodes and elongate (to 20 or even 28 cm. long); inflorescence very diffuse and open; calyx-lobes usually less than 2 mm. long and not or scarcely exceeding capsules; mature capsules 1.5–2.5 mm. long . . . . . 3. *H. tenuifolia.*

FF. Stems with 6–13 internodes; median internodes 1–4.5 cm. long; median cauline leaves narrow-elliptic, narrow-lanceolate, narrow-oblong, to linear, 4–11 times longer than wide; fertile branches usually with 2-several nodes and to 12 cm. long; inflorescence not diffuse and open; calyx-lobes 0.5–3.1 mm. long, always exceeding mature capsules; mature capsules 1.8–3.0 mm. long. 4b. *H. longifolia* var. *compacta.*

EE. Lowest internodes not as above.

G. Stems with 4–7 internodes, glabrous to somewhat pubescent or scabrous; New England, Great Lakes region, and Canada. 4a. *H. longifolia* var. *longifolia.*

GG. Stems with 6–13 internodes, glabrous or short-pubescent only at nodes; southwestern North Carolina and adjacent Georgia and South Carolina . . . . 4c. *H. longifolia* var. *glabra.*

NOTE: *H. longifolia* var. *compacta* and var. *glabra* in most of the herbaria examined in the present study have been annotated by the writer as *H. tenuifolia* (see discussion of relationships under the systematic treatment of the last species).

1. **Houstonia purpurea** L. Sp. Pl. 1:105. 1753.

Perennial herbs. Rhizomes simple or branched, horizontal or erect, sometimes subligneous, shortened or longer and more slender, to 5 cm. long, bearing many small roots. Stems erect or ascending, one-many, tetragonal and slightly winged, 0.4–4.5 dm. high, sparsely to densely pubescent to villous-pubescent below, especially at nodes, with multicellular hairs to 1.5 mm. long, or stem glabrous. Internodes numbering 4–12; median internodes 0.5–9.5 cm. long. Stipules lanceolate to deltoid, entire, irregularly toothed, or erose, often with dark glands at apices of teeth, obtuse, acute, or acuminate, to 5 mm. long, to 5.5 mm. wide. Basal leaves forming a rosette in winter, usually withered at time of flowering, rarely present, varying from oval to spatulate, tapering into petiole shorter than to rarely longer than blade, to 3.8 cm. long, to 1.3 cm. wide, glabrous below, pubescent or glabrous above, sometimes ciliolate. Cauline leaves 3–7 nerved; lower leaves sessile or short-petiolate, oblanceolate to ovate; median leaves sessile, broad-ovate and subcordate to narrow-lanceolate, 0.8–6.3 cm. long, 0.4–3.4 cm. wide, 1–6 times longer than wide, glabrous or pubescent on nerves below, pubes-

cent to glabrous above, ciliolate to glabrous on margins; upper leaves similar to median leaves, reduced in size and becoming bract-like in inflorescence. Branches ascending to spreading, to 19 cm. long, usually arising from uppermost 1–4 nodes, forming an open to rather compact, few to many flowered inflorescence. Pedicels slender, less than 8 mm. long. Calyces glabrous to sparsely pubescent or hirtellous; calyx-lobes erect or spreading, linear-lanceolate to ovate, 1.0–7.0 long, 0.3–3.0 mm. wide, ¼ as long to slightly exceeding corolla-tubes, equalling to considerably exceeding mature capsules. Corollas purplish to white or deep purple, 4–12 mm. long, granular to densely pubescent within; corolla-tubes 2.0–6.8 mm. long, 1.5–4.0 mm. wide distally; corolla-lobes 1.5–5.0 mm. long, 1.0–2.5 mm. wide. Mature capsules longer than wide, wider than long, or equal, 2.0–4.0 mm. long, 2.0–4.0 wide. Seeds 0.70–1.65 mm. long, 0.50–1.20 mm. wide.

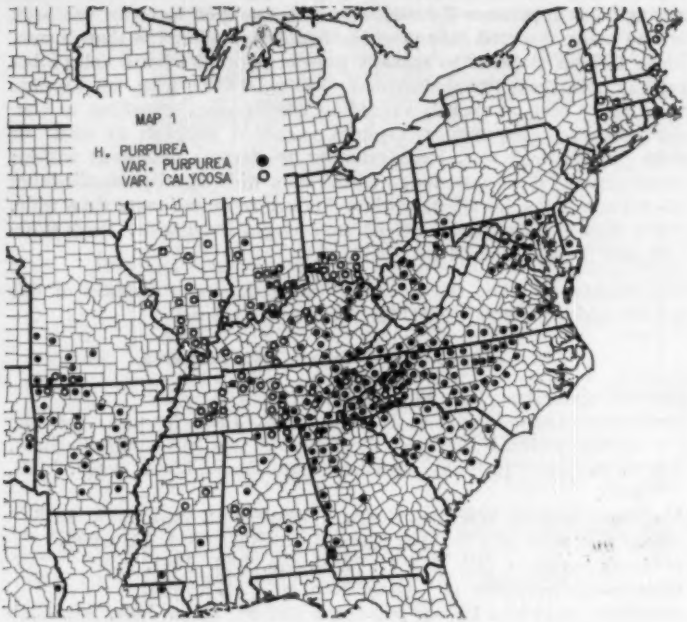
A discussion of the relationships among the three varieties of this species appears below under the individual varieties.

1a. Houstonia purpurea L. var. purpurea

Hedyotis umbellata Walt. Fl. Car. 85. 1788.
Houstonia varians Michx. Fl. Bor. Am. 1:86. 1803. (in part). (Type in Mus. d'Hist. Nat., Paris; photograph of type in Gray Herbarium).
Knoxia purpurea (L.) Lam. ex Poiret, Lam. Encyc. Meth., suppl. 3:225. 1813.
Houstonia latifolia Willd. ex Roem. & Schult. Syst. Veg. 3:527. 1818.
Anotis purpurea (L.) G. Don, Gen. Hist. 3:535. 1834. (in part).
Hedyotis purpurea (L.) T. & G. Fl. N. Am. 2:40. 1841.
Oldenlandia purpurea (L.) Gray, Man. ed. 2. 173. 1856.
Houstonia purpurea L. var. *pubescens* Britton, Mem. Torr. Bot. Club 4:125. 1894.
Chamisme purpurea (L.) Nieuwl. Am. Midl. Nat. 4:92. 1915.
Houstonia purpurea L. f. *pubescens* (Britt.) Fern. Rhod. 38:444. 1936.
Hedyotis purpurea (L.) T. & G. var. *purpurea* f. *pubescens* (Britt.) Fosberg, Castanea 19:33. 1954.

Rhizomes to 2.5 cm. long. Stems 1.0–4.5 dm. high, sparsely to densely pubescent (or rarely glabrate), with hairs (0.3–) 0.4–1.0 (–1.5) mm. long. Internodes numbering (4–) 5–8 (–9); median internodes (1.8–) 2.0–5.5 (–9.5) cm. long. Median cauline leaves broad-ovate and subcordate to lanceolate-ovate, (1.0–) 2.5–5.0 (–6.3) cm. long (0.6–) 1.2–3.0 (–3.4) cm. wide, 1–3.2 times longer than wide, pubescent to rarely glabrate above, ciliolate to glabrate on margins. Calyx-lobes linear-lanceolate to ovate-lanceolate, (1.0–) 2.0–3.9 mm. long, 0.3–1.2 mm. wide, usually less than ¾ as long as corolla-tubes, equalling or slightly exceeding mature capsules. Corollas purplish to white, (4–) 5–8 (–10) mm.

long. Mature capsules 2.0–3.5 mm. long, 2.0–3.5 wide. Seeds 0.70–1.20 mm. long, 0.50–1.00 mm. wide.



MAP 1. Distribution of two varieties of *Houstonia purpurea*.

Time of flowering: April or May through July or August, sometimes continuing into September.

Type locality: "Habitat in Virginia."

Type: Linnaean Herbarium. Sketch of type in Gray Herbarium; of two plants on the type sheet only the one on the right side is considered to be the type of var. *purpurea*.

Habitats and distribution: Moist and dry woods, openings, and borders of woods; roadsides; banks; cliffs; meadows; other secondary habitats. Ranges from Fayette County, Pennsylvania and Maryland south to southwestern Georgia, west across Alabama and Mississippi to Arkansas and easternmost Oklahoma, north into southwestern Missouri, east to southern Ohio. Within

these boundaries it occurs in all states and all physiographic provinces. There are very few collections, however, from the Mississippi Embayment. It is centered in the Appalachians and Ozarks, where it is present in more abundance than elsewhere. (Map 1).

In its typical form var. *purpurea* is unique in its ovate or broadly ovate leaves and short calyx-lobes. It is the most abundant and widely distributed variety in this complex. Other comments about it are noted under var. *calycosa*.

REPRESENTATIVE SPECIMENS: **Pennsylvania.** FAYETTE: Ohiopyle, *Ricker 1225* (US). **Maryland.** TALBOT: 5 mi. NE of Easton, *Tatnall 2964* (GH). **Virginia.** BRUNSWICK: S of Lawrenceville, *Fernald 14855* (GH, PH, US). GRAYSON: near Troutdale, *Gleason 8773* (NY). SUSSEX: SW of Burt, *Fernald & Long 6399* (GH, NY, US). **West Virginia.** CLAY: 1 mi. N of Clay, *Core 6343* (WVA). ROANE: Spencer, *W. Va. Bot. Exped.*, 21 June 1928 (GA, WVA). **North Carolina.** ALAMANCE: E of Burlington, *Oosting 33544* (DUKE). DURHAM: 5 mi. SW of Durham, *Wiegand & Manning 2999* (CU, GH); Eno River, *Oosting 3383* (OC). JOHNSTON: 2 mi. N of Clayton, *Fox & Godfrey 1668* (GH, IA, NCSC). PENDER: 10 mi. N of Burgaw, *Godfrey 6591* (GH, US). **South Carolina.** CLARENDON: 14 mi. S of Manning, *Godfrey & Tryon 984* (F, GH, MO, NY, US). EDGEFIELD: 4 mi. WSW of Owdoms, *Radford 22640* (NCU). MARION: S of Britton Neck, *Bell 7833* (NCU). **Georgia:** CHEROKEE: W of Canton, *Duncan 8387* (GA, IA, MO, NCSC). EARLY: W of Hilton, *Thorne 3881* (CU, IA). **Alabama.** CULLMAN: *Biltm. Herb. 519m.* (US). **Indiana.** JACKSON: ½ mi. E of Chestnut Ridge, *Deam 33524* (IND). **Kentucky.** CARTER: near Cascade Caverns, *Smith et al 3535* (GH, US). **Tennessee.** BLOUNT: Abrams Creek Ranger Station, *Sharp 17482* (TENN). COFFEE: Rutledge Falls near Tullahoma, *Sharp et al 4713* (TENN). KNOX: Knoxville, *Ruth 3598* (NY). **Missouri.** BARRY: Eagle Rock, *Bush 45* (F, MO, NY, US). CHRISTIAN: 3 mi. SW of Chadwick, *Steyermark 23155* (F, MO, NY, TENN, WIS). **Arkansas.** DREW: Monticello, *Demaree 19111* (CU, FSU, MO, NY, TENN, WIS). LINCOLN: Star City, *Demaree 19164* (GH, NY). **Louisiana.** TANGIPAHOA PARISH: 10 mi. E of Kentwood, *Ewan 18704* (NO). **Oklahoma.** LEFLORE: near Page, *Palmer 21593* (NY, Palmer). **Texas.** NEWTON: 24½ mi. NW of Deweyville, *Cory 22373* (GH).

1b. **Houstonia purpurea** L. var. **montana** (Small), n. comb.
Houstonia montana Small, Fl. S.E. U.S. 1325. 1903.
Houstonia purpurea var. *montana* Chickering, ibid. (as synonym).
Hedyotis purpurea (L.) T. & G. var. *montana* (Small) Fosberg, Castanea 19:33. 1954.

Rhizomes to 5 cm. long. Stems 0.4–2.1 dm. high, glabrous or short-pubescent at nodes. Internodes numbering (4–) 5–8 (–9); median internodes 0.5–3.0 (–4.4) cm. long. Median cauline leaves ovate, 0.8–3.0

cm. long, 0.6–1.3 cm. wide, 1–2.5 times longer than wide, glabrous to slightly pubescent above, glabrate or glabrous on margins. Branches less than 4 cm. long. Calyces glabrous; calyx-lobes ovate-lanceolate, lanceolate, or ovate, 1.0–3.1 (–4.5) mm. long, 0.6–1.2 (–3.0) mm. wide, usually less than three-fourths as long as corolla-tube, equalling or slightly exceeding mature capsules. Corollas deep purple, 8–12 mm. long. Mature capsules 2.0–4.0 mm. long, 2.0–4.0 mm. wide. Seeds (from one collection) 1.40–1.65 mm. long, 0.90–1.20 mm. wide.

Time of flowering: June through August or September.

Type locality: Roan Mountain, North Carolina.

Lectotype: J. W. Chickering, Jr., September 12, 1877. (NY!). Duplicates: (F!, PH!)

Habitats and distribution: Crevices of exposed rocks and in moist loam on rhododendron bald, Roan Mountain, N. C.-Tenn., and among rocks on Grandfather Mountain, N. C. Known only from summits of these two mountains, at altitudes of about 6000 feet (1829 meters).

The specimen I have chosen as lectotype appears to be the original collection by Chickering, which led Small to publish on this taxon. Chickering's collection label bears the identification, *H. purpurea* L. var. *montana*. He "proposed" the epithet but did not ever publish it in any combination. Small considered the taxon a species and published the varietal combination only as a synonym, which did not constitute valid publication (Art 37, Paris rules). In regard to the correct citation for the varietal combination Fosberg's comments (1954, p. 33) are pertinent.

Var. *montana* differs from var. *purpurea* as follows: stems are glabrous or nearly so; internodes are shorter; leaves smaller; corollas larger and colored deep purple; calyx-lobes, capsules, and seeds are larger. It is obvious that var. *montana* may, in most characteristics, be merely a high altitude, dwarfed form of var. *purpurea*. However, until this is proven by transplant experiments or by other means, it seems preferable to retain it as a variety. The rarity of occurrence also tends to favor the present course; there are a number of other mountain tops with high altitude balds and exposed rocks — why does not var. *montana* occur on these? Var. *purpurea* is common at such altitudes on other mountains in the southern Blue Ridge, but has not been

seen by the writer in habitats as exposed as those on Roan and Grandfather Mountains.

REPRESENTATIVE COLLECTIONS: **Roan Mountain.** (summit is on border, Mitchell Co., N. C.–Carter Co., Tenn.). Some early collections are: *Gray & Carey*, July 1841 (GH) (first known collection); *Vasey*, 1878 (NY, US); *Gray, Sargent, Redfield, & Canby*, 19 June 1879 (GH, NY, PH); *Chickering*, 5 July 1880 (F, MO, NCU, US); *Porter*, 9 July 1880 (PH); *J. D. Smith*, 10–16 July 1880 (F, US). Some later collections include: *Ball*, 15–17 Sept. 1884 (IA, OC, PH, WIS); Lyon's Bluff, elev. 6350 ft., *Small & Heller*, 16 July 1891 (F, MO, NY, PH, US); summit, *Blomquist 4961* (DUKE); near Roan High Bluff, *Shanks 3008* (FSU, TENN, US). **Grandfather Mountain.** (summit on border, Avery-Watauga Cos., N. C.). *Heller*, 11 Aug. 1890 (F, MO, NY); *Small & Heller 72*, 6 Aug. 1891 (CU, F); *Churchill*, 18 June 1899 (GH, TENN); *Stewart*, 6 July 1938 (NCU, NY).

1c. **Houstonia purpurea** L. var. **calycosa** Gray, Syn. Fl. 1 (2) :26. 1884.
Hedyotis lanceolata Lam. ex Poiret, Lam. Encyc. suppl. 3:14. 1813.
Anotis lanceolata (Poir.) DC. Prodr. 4:433. 1830.
Houstonia macrosepala Nutt. ex T. & G. Fl. N. Am. 2:40. 1840. (as synonym of an unnamed variety of *Hedyotis purpurea*).
?*Diodia Frankii* Steud. & Hochst. Abh. Böhm. Ges. Wiss. V. 3:86. 1843. (as synonym; this publ. not seen).
?*Spermococe lanceolata* (Poir.) Frank, ibid. (as synonym).
?*Hedyotis Frankii* Presl, Bot. Bemerk. 86. 1844. (as synonym; publ. not seen).
Hedyotis calycosa Shuttlew. ex Gray, Pl. Wright. 1:81. 1852. (as synonym).
Houstonia calycosa (Shuttlew. ex Gray) C. Mohr, Contr. U. S. Nat. Herb. 6:739. 1901.
Houstonia lanceolata (Poir.) Britton, Man. 861. 1901.
Houstonia lanceolata f. *albiflora* Standl. Rhod. 34:177. 1932.
Hedyotis purpurea (L.) T. & G. var. *calycosa* (Gray) Fosberg, Castanea 19:33. 1954.
Hedyotis purpurea var. *calycosa* f. *albiflora* (Standl.) Fosberg, loc. cit. 34. 1954.

Rhizomes to 2.5 cm. long. Stems 1.0-4.5 dm. high, pubescent to glabrate, usually sparsely pubescent. Internodes numbering 5–12: median internodes (1.8–) 2.0–5.5 (–9.5) cm. long. Median cauline leaves 3–5 nerved, lanceolate to narrow-lanceolate, 1.7–3.3 cm. long, 0.4–1.0 cm. wide, 3.3–6 times longer than wide, pubescent to glabrate above, ciliolate to glabrate on margins. Calyces glabrous to pubescent: calyx-lobes linear-lanceolate to lanceolate, 4.0–7.0 mm. long, 0.3–1.2 mm. wide, one-half as long to slightly exceeding corolla-tubes, considerably exceeding

mature capsules. Corollas purplish to white, (4–) 5–10 mm. long, tending to be pubescent within; corolla-tubes tending to be more widely flared than in var. *purpurea*. Mature capsules 2.0–3.5 mm. long, 2.0–3.5 mm. wide. Seeds 0.70–1.20 mm. long, 0.50–1.00 mm. wide.

Time of flowering: April or May through June or July, rarely August.

Type and type locality: The lectotype, collected by Rugel, is inscribed, "Hedyotis calycosa Shuttl. n. sp. In montibus prope Huntsville, Alabama, legit Rugel, Oct. 1843." (GH!; duplicate in NY!).

Habitats and distribution: Cedar glades, barrens, dry or somewhat mesic woods, rocky open places, fields. Scattered and local in New England; Wayne County, Michigan; Barbour County, West Virginia; southern Ohio south to northern Georgia, and Alabama, west to Missouri, Oklahoma, and Arkansas, north to central Illinois and central Indiana. Centered in the Interior Low Plateau (Fenneman) and adjacent Provinces. (Map 1)

In the treatment of this complex all names relating to white-flowered forms have been reduced to synonymy. It seems desirable to recognize color forms only when there is discontinuity in color. In all taxa of this group corolla color varies among colonies or within one colony or even among different flowers on the same plant. Color varies imperceptibly from purple or pink-purple to white through various intermediate degrees of purplish tinges and lines on a white background color. White-flowered plants are of frequent occurrence. The name, *H. purpurea,* is a misnomer, since this species often has white flowers.

In regard to the nomenclature of the present variety, it seems clear that under Art. 60, Paris rules, the combination adopted here is correct as it is the earliest in the rank of variety. Although the name, *Hedyotis calycosa,* is invalid (it was published only as a synonym, that does not mean that the combination, *Houstonia purpurea* var. *calycosa,* is illegitimate (Arts. 69 and 72 seem to bear on this point). Gray's description of this variety is adequate. In choosing a type specimen it seems desirable to fix the application of the epithet, *calycosa,* by going back to the original specimens to which this epithet (in an invalid specific combination)

was applied. For this reason the lectotype listed above was chosen; it is rather typical of the natural populations included in the present variety.

Gray's Manual, 8th edition, states that the capsules of var. *purpurea* are broader than high, those of var. *calycosa* as high as broad, but this distinction does not hold when large numbers of specimens are examined. The Manual also states that calyx-lobes in the latter variety range in length from 5 to 9 mm. The longest lobes seen during the present study were not more than 7 mm. long.

The main differences between these two entities are in length of calyx-lobes and in shape of median cauline leaves; the former character is the more important. To deal with the former character it is preferable to use the absolute length of lobes rather than the ratio, calyx-lobe length to corolla-tube length, because corolla length may vary considerably as a result of environmental influence, whereas lobe length is much less subject to such influence. In addition to the two main differences in these varieties, other lesser differences also exist: var *calycosa* tends to have more internodes, to be sparsely pubescent rather than ranging from densely pubescent to glabrate, and to have wider, more flaring, corollas which may be more pubescent within. These and other more minor differences are most noticeable in plants from the Cedar Glades of the Nashville Basin.

Specimens of typical var. *purpurea* have short calyx-lobes and ovate leaves. They occur in mesic woods throughout much of the eastern United States (see map). Typical specimens of var. *calycosa* have long calyx-lobes and lanceolate leaves. They occur primarily in cedar glades, barrens, and dry woods in the Cedar Glades of the Nashville Basin and in other parts of Tennessee, in central and western Kentucky, in northern and west-central Alabama, in at least two counties in central Mississippi, and in southwestern Missouri and adjacent Arkansas.

The preceding paragraph refers to typical specimens. When all available specimens referable to these two varieties are examined, it is evident that intergradation in the two primary diagnostic characters is complete. Plants with long calyx-lobes pre-

dominate from Ohio, Indiana, and Illinois south into Alabama and Mississippi. These plants may have leaves ranging from narrow-lanceolate to broad-ovate; therefore, lanceolate leaves are not always correlated with long calyx-lobes. If we were to designate var. *calycosa* as the variety with lanceolate leaves and long lobes, this would leave unclassified many collections with long lobes and ovate leaves (the latter a feature of var. *purpurea*). In this study it has been determined that length of lobes is the more important of the two primary characteristics; accordingly, this characteristic is used to provide positive separation. This reflects the definite regional distinction in lobe length: plants with long lobes are primarily midwestern; plants with short lobes have a much wider distribution and tend to grow in more mesic habitats.

It is believed that gene flow between these two varieties has been quite extensive in the Middle West. The populations in southern Ohio, Indiana, and Illinois are thought to be almost entirely "weedy" biotypes, the result of introgression among "purer" populations in Kentucky and Tennessee. Following introgression these "impure" biotypes may have spread northward onto the glaciated Central Lowland. In southern Ohio such plants resemble var. *purpurea* superficially because of their ovate leaves, but their longer calyx-lobs show the influence of genes from var. *calycosa*. This intervarietal introgression could have been facilitated by "hybridization of the habitat" after destruction of the original forest cover, and is assumed to have been accelerated since white settlement. Obviously, this theory to explain the existence of the "impure" populations in the Middle West relies heavily on aspects of the rather extensive and well known literature on introgression.

New England populations resembling these two varieties are a separate problem in themselves from the standpoint of origin. In morphology nearly all of these fall within the present circumcription of var. *calycosa*, but are not really typical of this variety. They are completely disjunct from other populations of both varieties. Apparently, they represent remnants of a formerly more widespread extension of var. *calycosa*. This may not neces-

sarily vitiate the above theory on origin of midwestern forms. Further opinions on their origin is pure conjecture. Some New England plants vary in the direction of *H. longifolia*. One collection from Wayne County, Michigan, resembles New England plants.

In summary, vars. *purpurea* and *calycosa* are distinct in their

MAP 2. Distribution of *Houstonia canadensis* and *H. tenuifolia*. Florida collection of later species is atypical.

extremes — they have in the past been considered separate species — but intergrade so greatly that they may only be separated statistically on one character difference — length of calyx-lobes. This probably reflects a regional difference in gene frequency. They are sympatric, with different centers of distribution but with overlapping ranges. Where they occur in the same region they usually occupy different habitats. The intergradation in morphology and in habitat may be the result of introgressive hybridization.

Representative collections from New England include the following: **Maine.** CUMBERLAND: Huston's field, Cumberland Center, *Chamberlain 1086* (US). YORK: North Berwick, *Parlin 797* (US). **Massachusetts.** BERKSHIRE: Sheffield Plain, *Townsend*, 10 Aug. 1896 (CU). **Connecticut.** OXFORD: Oxford, *Harger*, 14 June 1896 (GH). **New York.** ESSEX: N of Schroon River P.O., *House 27763*, 17 Sept. 1941 (CU, GH).

Plants with broad-ovate leaves and long calyx-lobes are exemplified by the following: **Indiana.** HARRISON: 2 mi. SE of Corydon, *Deam 16331* (IND) (lobes to 6.9 mm. long). POSEY: 9 mi. SW of Mt. Vernon, *Hermann 6655* (MICH, US).

The following represent typical var. *calycosa*, with lanceolate or ovate-lanceolate leaves and long calyx-lobes: **Tennessee.** DAVIDSON: Mt. View, *Svenson 10006* (DUKE, GH, TENN). KNOX: 1 mi. E of Mascot, *Cain et al*, 2 June 1937, Plantae Exs. Grayanae 870, (CU, DUKE, F, GH, IA, MICH, MO, NCSC, NCU, NY, PH, TENN, US, WIS, WVA). RUTHERFORD: cedar glade near Lavergne, *Harper*, 17 May 1923 (GH, NY, US). WILSON: near Lebanon, *Shanks 1540* (TENN). **Illinois.** MACON: *Clokey 2424* (F, GH, MICH, MO, NY, US). **Missouri.** BARRY: Eagle Rock, *Bush 3148* (F, NY, US). **Arkansas.** CARROLL: near Elk Ranch, *Palmer 39458* (GH).

2. **Houstonia canadensis** Willd. ex R. & S. Syst. 3:527. 1818.

Houstonia ciliolata Torrey, Fl. N. & Mid. U.S. 1:173–174. 1824.
Hedyotis ciliolata (Torr.) Spreng. Syst. 4: cur. post. 40. 1827.
Anotis ciliolosa G. Don, Gen. Hist. 3:535. 1834.
Oldenlandia purpurea (L.) Gray var. *ciliolata* (Torr.) Gray, Man. ed. 2. 173. 1856.
Houstonia longifolia Gaertn. γ *ciliolata* (Torr.) Wood, Class-Book, ed. 1861. 403. 1861.
Houstonia purpurea L. var. *ciliolata* (Torr.) Gray, Man. ed. 5. 212. 1868.
Chamisme ciliolata (Torr.) Nieuwl. Am. Midl. Nat. 4:92. 1915.
Hedyotis canadensis (Willd. ex R. & S.) Fosberg, Va. Jour. Sci. 2:110. 1941. (in part)

Houstonia setiscaphia Carr, Rhod. 46:309. 1944.

Hedyotis purpurea (L.) T. & G. var. *ciliolata* (Torr.) Fosberg, Castanea 19:34. 1954.

Hedyotis purpurea (L.) T. & G. var. *setiscaphia* (Carr) Fosberg, loc. cit. 35. 1954.

Perennial herbs. Rhizomes branched or simple, slender, usually more or less horizontal, to 8.3 cm. long, bearing many small roots. Stems erect or ascending, one to several, tetragonal and sometimes slightly winged, 0.4–2.5 dm. high, glabrous to pubescent below, especially at nodes, with multicellular hairs to 0.7 mm. long. Internodes numbering 3–5 (6) ; median and lower ones 1–8 cm. long, longer than upper ones. Stipules deltoid to ovate-lanceolate, rounded to acute to short-acuminate or uppermost ones irregularly lobed or erose, often with dark glands on margins, to 4 mm. long, to 5 mm. wide; stipules of median nodes usually more or less ovate, rounded above, and about as wide as long. Basal leaves forming winter rosettes or in northern part of range forming short offsets, persisting through fruiting stage, varying from oval to spatulate, attenuate below into petioles shorter than to slightly longer than blade, to 3.9 cm. long, to 0.8 cm. wide, glabrous below, hirtellous to pubescent above, ciliolate (sparsely ciliolate to glabrate in certain populations in south central Ohio) . Cauline leaves 1-nerved, oblanceolate, obovate, elliptic, or narrowly elliptic, (0.5–) 0.8–2.3 (–3.1) cm. long, 0.15–0.85 cm. wide, usually 2.5–6 times longer than wide, glabrous or pubescent on midrib below, pubescent to glabrous above, ciliolate to glabrate on margins. Branches ascending or spreading, less than 8 (rarely to 12) cm. long and usually arising from uppermost 1–3 nodes, forming a rather open, few-many flowered, inflorescence. Pedicels slender, to 7 mm. long. Calyces glabrous to hirtellous; lobes erect or spreading, linear-lanceolate to lanceolate, 1.6–3.5 (–4.5) mm. long, 0.5–1.0 mm. wide, one-fourth as long to nearly equalling corolla-tube, equalling or exceeding mature capsules. Corollas white to purplish, (3–) 4–9 (–11) mm. long, granular to pubescent within; corolla-tubes 2–7 mm. long, 1.5–4 mm. wide distally; corolla-lobes 1.5–5 mm. long, 1–2.5 mm. wide. Mature capsules 2–3.5 mm. long, 2–3.2 mm. wide. Seeds 0.70–1.30 mm. long, 0.50–0.90 mm. wide.

Time of flowering: April to June, rarely into August.

Type locality: "E. Canada".

Type: Willdenow no. 2684, Botanical Museum, Berlin.

Habitats and distribution: Dry to moist woods; openings; cliff tops; banks and roadsides; sandy shores; often in rocky soil over shale or limestone. Bruce Peninsula, Manitoulin Island, and Northumberland County, Ontario, southward through Michigan, Ohio, western New York, southwestern Pennsylvania and

adjacent West Virginia, southernmost Indiana, central and eastern Kentucky, southwestern Virginia, Tennessee, to Lookout Mountain area of Tennessee-Georgia. Distribution generally rather disjunct. (Map 2)

The locating of the type specimen in the Berlin herbarium establishes that *H. canadensis,* not *H. ciliolata,* is the correct name. Two photographs of the type specimen were forwarded to the writer and clearly represent the present species.

The relation between this species and *H. longifolia* was discussed by Standley and by Fosberg. Standley (1936) in a note on the apparent breakdown of characters separating these two species in specimens from Indiana, advocated either the reduction of *H. canadensis* to synonymy under *H. longifolia* or else the recognition "as a rather poorly marked variety *H. longifolia* var. *ciliolata* (Torr.) Wood". Fosberg (1941a) combined the two species, finding it necessary to adopt a new combination under *Hedyotis.* Fosberg (1954) made all species of this complex varieties of *H. purpurea.*

The two species in question are as distinct as any in this complex. Comparison of them in Indiana is rather misleading because *H. canadensis* occurs in only two counties in southernmost Indiana and *H. longifolia* in its typical form does not occur in the state at all. Specimens seen of *H. longifolia* from Indiana include two groups: collection from two Ohio River counties not quite typical of var. *compacta*; a larger number of collections from several central and nothern counties regarded here as "atypical" var. *longifolia.*

Houstonia setiscaphia was described by Carr (Rhod. 46:306-310. 1944) from cedar glades in southwestern Virginia (Type in Gray Herbarium; isotype in herb. Univ. of Pa.; *Lloyd G. Carr 1110,* dry glades or barrens among the cedars ca. ½ mile west of Jonesville, "The Cedars", Lee Co., Va., July 10, 1942). Located in the Ridge and Valley Province just south of the Cumberland Mountains, these glades are small in area but very similar ecologically and floristically to the well-known glades in the Nashville Basin, Tennessee, where only *H. purpurea* var. *calycosa* occurs. In company with Dr. R. W. Barbour the writer made two col-

lections of Carr's new species, one collection five and one-half, the other eight miles southwest of Jonesville, on June 22, 1948.

Carr's published comparison of *H. setiscaphia* with its nearest relative, *H. canadensis,* stated that the two species differed in the following characters: height of plants; vestiture of stem-angles (*H. setiscaphia* has a grayish aspect due to greater amount of vestiture); compactness of inflorescence; shape of cauline and basal leaves; vestiture of calyx; size of corollas.

In the present writer's M. S. thesis (Cornell University, 1949) a tabular comparison was made of two of my collections of *H. setiscaphia* with sixteen collections of *H. canadensis* from throughout its range. This comparison demonstrated that very little difference exists between the two taxa in regard to the first three characters listed above as well as in the shapes of cauline leaves. Average sizes of corollas differ somewhat, the average length being 4.7 mm. in Carr's new species, and 6.4 mm. in *H. canadensis.* This difference, however, is thought to be due to environmental modification. In all taxa of the *H. purpurea* complex later-flowering plants have smaller corollas, caused perhaps by reduced precipitation in summer. Both Carr and the writer collected *H. setiscaphia* in later-flowering condition. Environmental influence in strong, also, on the density of inflorescences.

Shapes of basal leaves in *H. setiscaphia* are usually oblanceolate but vary to elliptic or oval; in *H. canadensis* shapes are more commonly oval or elliptic but may vary to spatulate, oblanceolate, or obovate. This difference overlaps so much that it is judged not to be significant.

The most important characteristic of *H. setiscaphia* is its "hispid" (or hirsutulous) calyces. The type specimen, examined while on loan from the Gray Herbarium, proved to be slightly more hirsutulous than other collections. Calyces of plants of *H. setiscaphia* are usually hirsutulous but vary to glabrous. Specimens of *H. canadensis* are usually glabrous but four out of sixteen collections vary from glabrous to pubescent, one collection varies from glabrous to hirsutulous, and one collection consists entirely of hirsutulous plants.

Carr's interpretation of *H. canadensis* was based apparently on

a preponderance of northern collections. Southern collections are more hairy than northern ones, and are, therefore, more like *H. setiscaphia*. The three available collections of *H. setiscaphia* demonstrate more variability than Carr's report suggested. This taxon may even have glabrous calyces, and both taxa overlap in other characters as well.

An additional collection, (*Carr 775*, clinging in crevices of limestone, Natural Tunnel, Scott Co., Va.) from a county adjacent to Lee, was seen among specimens on loan from the Gray Herbarium. It includes plants with glabrate to rather densely short-pubescent calyces; therefore, it falls within the range of variation possessed by both taxa.

Besides the Scott County, Virginia, collection, perhaps more nearly referable to *H. canadensis* than to the other presumed taxon other collections show that the two are not well-separated geographically. Collections of *H. canadensis*, which is likely to be disjunct anyway, from Grainger County, Tennessee, and Whitley County, Kentucky, are only forty and fifty miles, respectively, from Lee County, Virginia. (see Map 2).

It is concluded that morphological differences between the two taxa are not even sufficient to maintain *H. setiscaphia* as a variety of *H. canadensis*. The former may be thought of as a local extreme or local race which is genetically slightly different. Not giving it formal taxonomic recognition is consistent with the treatment here of the remainder of the *H. purpurea* complex.

Dr. E. Lucy Braun has called attention (in correspondence) to local populations of *H. canadensis* which have glabrate basal leaves. These occur in unglaciated south central Ohio in Adams, Highland, and Ross Counties. My own sampling of these populations indicated that they represent a local extreme which overlaps rather extensively in the single character with ordinary *H. canadensis*. Glabrate plants did not seem to be restricted to any one geological formation. Collections consisted of varying proportions of glabrate, ciliolate, and intergradant plants. Considering the great variability in *H. canadensis* as a whole this local extreme is not worth taxonomic recognition.

(*to be concluded*)

PEUCEDANUM PALUSTRE, AN INTERESTING ADDITION TO THE FLORA OF ESSEX COUNTY, MASSACHUSETTS. On July 9, 1958, while leading a flower walk on Pike Bridge Road in the Artichoke Region of West Newbury, Massachusetts, one of the participants asked me to name a fairly large flowering umbellifer growing under apparently natural conditions near the water and I was somewhat embarrassed to confess that I was unable to do so. In September, Mr. Henry Lewis brought me good fruiting material of what was obviously the same taxon which he had found on Rogers Street about half a mile from where the flowering specimen was collected. Even with the fruit I still was unable to name the plant and I turned to Mrs. Claude Weber and Dr. Lincoln Constance for help. They were finally able to identfy it as *Peucedanum palustre* (L.) Moench., of Europe. Apparently this is the first North American record of the species. The long slender involucral bracts of the compound umbels are a very striking feature of the inflorescence. The specimen has been deposited in the Gray Herbarium and I hope to obtain additional material next year. Roadside, Pike Bridge Road, West Newbury, Essex County, Massachusetts, *Stuart K. Harris 18059* (9 July 1959). — STUART K. HARRIS, BOSTON UNIVERSITY.

CORRECTION FOR MAY ISSUE. — The literature cited portion of the article on *Rhododendron maximum* by A. R. Hodgdon and R. Pike was inadvertently omitted. This matter is as follo vs:

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